# NATIONAL GUIDELINE CLEARINGHOUSE™ (NGC) GUIDELINE SYNTHESIS

# DIAGNOSIS AND EVALUATION OF CHRONIC HEART FAILURE (CHF)

## Guidelines

1. **Heart Failure Society of America (HFSA)**. Evaluation of patients for ventricular dysfunction and heart failure: HFSA 2006 comprehensive heart failure practice guideline. J Card Fail 2006 Feb;12(1):e16-25. [33 references]
2. **National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand (NHFA/CSANZ)**. Guidelines for the prevention, detection and management of chronic heart failure in Australia, 2006. Sydney (Australia): National Heart Foundation of Australia; 2006 Nov. 79 p. [335 references]
3. **Scottish Intercollegiate Guidelines Network (SIGN)**. Management of chronic heart failure. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2007 Feb. 53 p. (SIGN publication; no. 95). [155 references]

## INTRODUCTION

A direct comparison of Heart Failure Society of America (HFSA), National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand (NHFA/CSANZ), and Scottish Intercollegiate Guidelines Network (SIGN) recommendations for the diagnosis of chronic heart failure (CHF) is provided in the tables, below.

- Table 1 provides a quick-view glance at the primary interventions considered by each group.
- Table 2 provides a comparison of the overall scope of both guidelines.
- Table 3 provides a more detailed comparison of the specific recommendations offered by each group for the topics under consideration in this synthesis, including:
    - Clinical Presentation/Assessment of Signs & Symptoms
    - Diagnostic Investigations
- Table 4 lists the potential benefits and harms associated with the implementation of each guideline as stated in the original guideline.
- Table 5 presents the rating schemes used by the guideline groups to rate the level of evidence and/or the strength of the recommendations.

Following the content and recommendation comparison tables, the areas of agreement and areas of differences among the guidelines are identified.

Abbreviations used in the text and table

- BNP, B-type natriuretic peptide
- CAD, coronary artery disease
- CHD, coronary heart disease
- CHF, chronic heart failure
- CMRI, cardiac magnetic resonance imaging
- CSANZ, Cardiac Society of Australia and New Zealand
- ECG, electrocardiogram
- HDL, high-density lipoprotein
- HFPSF, heart failure with preserved systolic function
- HFSA, Heart Failure Society of America
- JVP, jugular venous pressure
- LDL, low-density lipoprotein
- LV, left ventricular
- LVEF, left ventricular ejection fraction
- MI, myocardial infarction
- MRI, magnetic resonance imaging
- NHFA, National Heart Foundation of Australia
- NT-proBNP, N terminal pro B-type natriuretic peptide
- NYHA, New York Heart Association
- PET, positron emission tomography
- PND, paroxysmal nocturnal dyspnoea
- SIGN, Scottish Intercollegiate Guidelines Network

**TABLE 1: COMPARISON OF INTERVENTIONS AND PRACTICES CONSIDERED**
*("✓" indicates topic is addressed)*

| | HFSA (2006) | NHFA/CSANZ (2006) | SIGN (2007) |
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| Clinical Presentation/Assessment of Signs & Symptoms | ✓ | ✓ | ✓ |
| Diagnostic Investigations | ✓ | ✓ | ✓ |

| **TABLE 2: COMPARISON OF SCOPE AND CONTENT** | |
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| **Objectives and Scope** | |
| **HFSA (2006)** | To provide recommendations for the evaluation of patients for ventricular dysfunction and heart failure |
| **NHFA/CSANZ** | • To obtain better health outcomes by improving the |

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| **(2006)** | management of CHF<br>• To reduce unwarranted variation from best practice treatment of CHF throughout Australia |
| **SIGN (2007)** | To present evidence-based recommendations for diagnostic testing, lifestyle modification, optimum pharmacological and interventional treatments, organisation of care and discharge planning, and palliative care of patients with CHF. |
| **Target Population** | |
| **HFSA (2006)** | • Patients at risk of developing HF<br>• Patients suspected of having HF based on signs and symptoms or incidental evidence of abnormal cardiac structure or function<br>• Patients with established symptomatic HF |
| **NHFA/CSANZ (2006)** | Patients with, or at risk of developing, CHF |
| **SIGN (2007)** | Adult patients with CHF |
| **Intended Users** | |
| **HFSA (2006)** | Physicians |
| **NHFA/CSANZ (2006)** | Advanced Practice Nurses<br>Allied Health Personnel<br>Nurses |
| **SIGN (2007)** | Advanced Practice Nurses<br>Allied Health Personnel<br>Nurses<br>Physician Assistants<br>Physicians |

| **TABLE 3: COMPARISON OF RECOMMENDATIONS** | |
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| **Clinical Presentation/Assessment of Signs and Symptoms** | |
| **HFSA (2006)** | **Patients Suspected of Having HF.** The evaluation of patients suspected of having HF focuses on interpretation of signs and |

symptoms that have led to the consideration of this diagnosis. Careful history and physical examination, combined with evaluation of cardiac structure and function, should be undertaken to determine the cause of symptoms and to evaluate the degree of underlying cardiac pathology.

**Evaluation of Patients Suspected of Having HF**

- Symptoms Consistent with HF. The symptoms listed below suggest the diagnosis of HF. It is recommended that each of these symptoms be solicited and graded in all patients in whom the diagnosis of HF is being considered. **(Strength of Evidence = B)**

**Symptoms Suggesting the Diagnosis of HF**

Symptoms

Dyspnea at rest or on exertion
Reduction in exercise capacity
Orthopnea
PND or nocturnal cough
Edema
Ascites or scrotal edema

Less Specific Presentations of HF

Early satiety, nausea and vomiting, abdominal discomfort
Wheezing or cough
Unexplained fatigue
Confusion/delirium

- Physical Examination. It is recommended that patients suspected of having HF undergo careful physical examination with determination of vital signs and be carefully evaluated for signs and symptoms shown below. **(Strength of Evidence = C)**

**Signs to Evaluate in Patients Suspected of Having HF**

1. *Cardiac Abnormality:* Elevated cardiac filling pressures and fluid overload
   *Signs:* Elevated JVP; S3 gallop; rales; hepatojugular reflux; ascites; edema
2. *Cardiac Abnormality:* Cardiac enlargement
   *Signs:* Laterally displaced or prominent apical impulse; murmurs suggesting valvular dysfunction

- Differential Diagnosis. The differential diagnoses below should be considered as alternative explanations for signs

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| | and symptoms consistent with HF. **(Strength of Evidence = C)**<br><br>**Differential Diagnosis for HF Symptoms and Signs**<br><br>• Myocardial ischemia<br>• Pulmonary disease (pneumonia, asthma, COPD, pulmonary embolus, primary pulmonary hypertension)<br>• Sleep-disordered breathing<br>• Obesity<br>• Deconditioning<br>• Malnutrition<br>• Anemia<br>• Hepatic failure<br>• Renal failure<br>• Hypoalbuminemia<br>• Venous stasis<br>• Depression<br>• Anxiety and hyperventilation syndromes |
| **NHFA/CSANZ (2006)** | **Symptoms of CHF**<br><br>A full medical history is important, both in determining the cause/s of CHF (including past history of CHD, hypertension, or rheumatic fever; alcohol consumption; family history of CHF or cardiomyopathy), and assessing the severity of the disease.<br><br>In patients with LV dysfunction, symptoms of CHF may develop relatively late. Furthermore, many patients claim to be asymptomatic, largely due to their sedentary lifestyle.<br><br>The following symptoms may occur in patients with CHF.<br><br>• Exertional dyspnoea is present in most patients, initially with more strenuous exertion, but later progresses to occur on level walking and eventually at rest. It also occurs in many other conditions.<br>• Orthopnoea — patients may prop themselves up on a number of pillows to sleep. This indicates that the symptoms are more likely to be due to CHF, but occur at a later stage.<br>• PND also indicates that the symptoms are more likely to be due to CHF, but most patients with CHF do not have PND.<br>• Dry irritating cough may occur, particularly at night. Patients may be mistakenly treated for asthma, bronchitis or angiotensin-converting enzyme inhibitor (ACEI)-induced cough.<br>• Fatigue and weakness may be prominent, but are common in other conditions. |

- Dizzy spells or palpitations which may indicate an arrhythmia.

Symptoms related to fluid retention may occur in patients with more advanced CHF, such as epigastric pain, abdominal distension, ascites, and sacral and peripheral oedema. In some patients, a therapeutic trial of diuretic therapy may be useful. A successful response increases the likelihood that the symptoms are due to CHF.

*Practice Point*

Clinical diagnosis of CHF is often unreliable, especially in obese patients, those with pulmonary disease and the elderly. Therefore, it is important to perform investigations to confirm the diagnosis.

**Physical Examination**

A careful physical examination is important for initial diagnosis of CHF, identification of potential causes or aggravating factors, and ongoing evaluation of disease status.

It is very important to appreciate that patients with CHF may show no detectable abnormal physical signs, because they are typically a late manifestation. Furthermore, many of the signs may occur in other conditions. It may also be difficult to detect physical signs that are present unless the doctor is experienced in examining CHF patients. Consequently, investigations for suspected CHF should often be initiated on the basis of symptoms alone, most commonly unexplained breathlessness.

The following signs may be present:

- Signs of underlying cardiac disease, including a displaced apex beat, or a murmur which may indicate underlying valve disease
- Signs of fluid retention, including soft basal inspiratory crepitations which do not clear with coughing, resting tachypnoea (requiring the patient to sit up to obtain relief), raised JVP, ankle and sacral oedema, ascites or tender hepatomegaly
- Signs of cardiac strain, including tachycardia or a third heart sound
- Other abnormal vital signs such as reduced arterial oxygen saturation.

*Practice Point*

The classic symptom of CHF is exertional dyspnoea or fatigue.

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| | Orthopnoea, PND and ankle oedema may appear at a later stage.<br><br>Physical signs are often normal in the early stages. Examination should include assessment of vital signs, cardiac auscultation (murmurs, S3 gallop) and checking for signs of fluid retention (e.g., raised JVP, peripheral oedema, basal inspiratory crepitations).<br><br>Underlying aggravating or precipitating factors (e.g., arrhythmias, ischaemia, non-adherence to diet or medications, infections, anaemia, thyroid disease, addition of exacerbating medications) should be considered and managed appropriately. |
| **SIGN (2007)** | **Diagnosing Heart Failure**<br><br><u>Clinical Examination</u><br><br>There is no symptom or sign that is both sensitive and specific for the diagnosis of CHF and a purely clinical diagnosis is problematic. Table 2 in the original guideline document reports sensitivities and specificities of some common symptoms associated with CHF.<br><br>The following signs are more specific for heart failure and should be sought in patients presenting with symptoms suggestive of CHF:<br><br>• Raised JVP<br>• Lateral displacement of the apex beat<br>• Presence of a third heart sound (S3)<br>• Basal crepitations<br>• Peripheral oedema<br><br>Identification of any of these signs adds to the clinical suspicion of CHF (see Table 3 in the original guideline document). Many patients will not exhibit any of these signs.<br><br>Pulse rate and rhythm and blood pressure should also be measured and recorded.<br><br>Pulmonary crepitations and ankle oedema are relatively common signs in presenting patients, but are not specific to heart failure. In clinical practice it is the combination of symptoms and signs, and the presence or otherwise of a likely cause of heart failure which is most useful. |
| **Diagnostic Investigations** | |

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| **HFSA (2006)** | **<u>Evaluation of Patients at Risk</u>**<br><br>**Method of Evaluation**. Selected groups of high-risk patients and patients with signs and symptoms of HF should undergo echocardiographic examination to assess cardiac structure and function. This initial examination may identify patients with cardiac dysfunction with or without symptomatic HF.<br><br>**Echocardiography**. The presence of certain risk factors makes the likelihood of underlying ventricular remodeling and dysfunction sufficiently likely to warrant diagnostic echocardiography (see below).<br><br>Characterization of ventricular structure and function is critical for proper diagnosis, estimation of prognosis, and therapeutic decision-making. Echocardiographic and Doppler assessment should include analysis of chamber size, valve function, LV mass and wall thickness, parameters of LV systolic and diastolic function, the presence of pulmonary hypertension, and the presence of pericardial disease. Approximately 50% of patients with symptoms and signs of HF have a preserved LVEF. In patients whose echocardiographic imaging is unsatisfactory, other techniques such as radionuclide ventriculography, cardiac MRI or CT may be used.<br><br>**Risk Factors Indicating the Need to Assess Cardiac Structure and Function in Patients at Risk for HF**<br><br>• CAD (e.g., after MI, revascularization)<br>• Valvular heart disease<br>• Family history of cardiomyopathy in a first-degree relative<br>• Atrial fibrillation or flutter<br>• Electrocardiographic evidence of LVH, left bundle branch block, or pathologic Q waves<br>• Complex ventricular arrhythmia<br>• Cardiomegaly, S3 gallop, or potentially significant heart murmurs by physical examination<br><br>• Determination of plasma BNP or NT-proBNP concentration is not recommended as a routine part of the evaluation for structural heart disease in patients at risk but without signs and symptoms of HF. **(Strength of Evidence = B)**<br><br>A low plasma BNP concentration has a high negative predictive value for ventricular dysfunction in patients with dyspnea, and may therefore be used to exclude HF as a cause of dyspnea with a high degree of certainty. BNP concentration has not been shown to be as effective in identifying asymptomatic patients with ventricular dysfunction. |

**Evaluation of Patients Suspected of Having HF**

- It is recommended that BNP or NT-proBNP levels be assessed in all patients suspected of having HF when the diagnosis is not certain. **(Strength of Evidence = B)**
- Standard Laboratory Tests. It is recommended that the following laboratory tests be obtained routinely in patients being evaluated for HF: serum electrolytes, blood urea nitrogen, creatinine, glucose, calcium, magnesium, lipid profile (LDL cholesterol, HDL cholesterol, triglycerides), complete blood count, serum albumin, liver function tests, urinalysis, and thyroid function. **(Strength of Evidence = B)**
- ECG. It is recommended that all patients with HF have an ECG performed to:
    - Assess cardiac rhythm and conduction
    - Detect LV hypertrophy
    - Evaluate QRS duration, especially when ejection fraction < 35%
    - Detect evidence of myocardial infarction or ischemia **(Strength of Evidence = B)**
- Chest X-Ray. It is recommended that all patients with HF have a posteroanterior and lateral chest X-ray examination for determination of heart size, evidence of fluid overload, and detection of pulmonary and other diseases. **(Strength of Evidence = B)**
- Additional Laboratory Tests. It is recommended that patients with no apparent etiology of HF or no specific clinical features suggesting unusual etiologies undergo additional directed blood and laboratory studies to determine the cause of HF. **(Strength of Evidence = C)**
- Exercise testing is not recommended as part of routine evaluation in patients with HF. Specific circumstances in which maximal exercise testing with measurement of expired gases should be considered include:
    - Assessing disparity between symptomatic limitation and objective indicators of disease severity
    - Distinguishing non HF-related causes of functional limitation, specifically cardiac versus pulmonary
    - Considering candidacy for cardiac transplantation or mechanical intervention
    - Determining the prescription for cardiac rehabilitation
    - Addressing specific employment capabilities

- Exercise testing with physiologic testing for inducible abnormality in myocardial perfusion or wall motion abnormality should be considered to screen for the presence of coronary artery disease with inducible ischemia. **(Strength of Evidence = C)**

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| | • Routine endomyocardial biopsy is not recommended in cases of new-onset HF. Endomyocardial biopsy should be considered in patients with rapidly progressive clinical HF or ventricular dysfunction, despite appropriate medical therapy. Endomyocardial biopsy also should be considered in patients suspected of having myocardial infiltrative processes, such as sarcoidosis or amyloidosis, or in patients with malignant arrhythmias out of proportion to LV dysfunction, where sarcoidosis and giant cell myocarditis are considerations. **(Strength of Evidence = C)** |
| **NHFA/CSANZ (2006)** | **Diagnostic Investigations**<br><br>*Practice Point*<br><br>All patients with suspected CHF should undergo an ECG, chest x-ray, and echocardiogram, even if the physical signs are normal.<br><br>Full blood count, plasma urea, creatinine, and electrolytes should be measured during the initial workup, and if there are any changes in the patient's clinical status. Urea, creatinine, and electrolytes should also be checked regularly in stable patients, and when changes are made to medical therapy.<br><br>The role of plasma BNP measurements is evolving, but it has been shown to improve diagnostic accuracy in patients presenting with unexplained dyspnoea. In patients with new symptoms, where the diagnosis is not clear following the initial clinical assessment and an echocardiogram cannot be organised in a timely fashion, then measurement of BNP or NT-proBNP may be helpful. In this setting, a normal level makes the diagnosis of heart failure unlikely (especially if the patient is not taking cardioactive medication). If the level is raised, further investigation—including echocardiography — is warranted.<br><br>**Recommendations for Diagnostic Investigation of CHF**<br><br>• All patients with suspected CHF should undergo an echocardiogram to improve diagnostic accuracy and determine the mechanism of heart failure. **(Grade of recommendation = D)**<br>• Coronary angiography should be considered in patients with a history of exertional angina or suspected ischaemic LV dysfunction. **(Grade of recommendation = D)**<br>• Plasma BNP measurement may be helpful in patients presenting with recent-onset dyspnoea; it has been shown to improve diagnostic accuracy with a high negative predictive value. (Berger et al., 2002) **(Grade of** |

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| | **recommendation = B)**<br>• Haemodynamic measurements may be particularly helpful in patients with refractory CHF, recurrent HFPSF (diastolic CHF), or in whom the diagnosis of CHF is in doubt (Stevenson et al., 1990) **(Grade of recommendation = D)**<br>• Endomyocardial biopsy may be indicated in patients with cardiomyopathy with recent onset of symptoms, where CHD has been excluded by angiography, or where an inflammatory or infiltrative process is suspected (McCarthy et al., 2000) **(Grade of recommendation = D)**<br>• Nuclear cardiology, stress echocardiography and PET can be used to assess reversibility of ischaemia and viability of myocardium in patients with CHF who have myocardial dysfunction and CHD. Protocols have been developed using MRI to assess ischaemia and myocardial viability, and to diagnose infiltrative disorders. However, MRI is not widely available. **(Grade of recommendation = D)**<br>• Thyroid function tests should be considered, especially in older patients without pre-existing CHD who develop atrial fibrillation, or in whom no other cause of CHF is evident. **(Grade of recommendation = D)** |
| **SIGN (2007)** | **Diagnosing Heart Failure**<br><br><u>Clinical Examination</u><br><br>Basic early investigations are necessary to differentiate heart failure from other conditions and to provide prognostic information. Urinalysis, serum urea and creatinine tests may help to determine if there is kidney failure, since symptoms of kidney disease are similar to those of CHF. Chest X-ray may indicate signs of CHF such as cardiomegaly, pulmonary congestion or pleural effusion and also non-cardiac indications such as lung tumours which account for breathlessness.<br><br>**GPP** - Patients suspected of CHF should receive a range of basic tests. The investigations will vary depending on the presentation but should usually include a full blood count, fasting blood glucose, serum urea and electrolytes, urinalysis, thyroid function and chest X-ray.<br><br><u>Further Investigations</u><br><br>Following clinical examination and basic investigations, a decision must be made as to whether the patient should undergo an echocardiogram. To help make this decision, the patient should undergo either an ECG or BNP test, or both depending on local circumstances. If either test is abnormal, |

there is sufficient likelihood of heart failure to warrant echocardiography to confirm a diagnosis. If both tests are normal, heart failure is unlikely and alternative tests for the symptoms should be considered.

If echocardiography suggests a diagnosis of heart failure, an ECG should be done (if it has not already been done) to help identify the underlying cause of the heart failure.

Pulmonary function tests should be considered in selected patients, i.e., in those whom heart failure is excluded and also in those with heart failure and comorbid lung disease which may contribute to dyspnoea.

Electrocardiography

The ECG is used firstly as a screening test to assess the likelihood of CHF and the need for subsequent echocardiography to confirm or refute a diagnosis. It is unusual for a patient with CHF to have a normal ECG. The ECG abnormalities reported in heart failure are all non-specific, and relatively common in elderly patients. The specificity of an abnormal ECG is relatively poor (around 60% at best).

Electrocardiographic abnormalities in CHF include:

- Pathological Q waves
- Left bundle branch block
- Left ventricular hypertrophy (LVH)
- Atrial fibrillation
- Non-specific ST and/or T wave changes

Electrocardiography is also useful once CHF has been confirmed as it may help to determine the cause (e.g., Q waves indicate previous myocardial infarction, LVH is seen in hypertension and aortic valve disease) and it is important to exclude atrial fibrillation.

BNP

BNP and NT pro-BNP are suitable for widespread use as a screening test in patients with suspected CHF, assuming appropriate quality control of the assay and selection of appropriate cut-off values for the patients tested. BNP levels fall after commencing therapy for CHF, e.g., diuretics, so the sensitivity is lower in patients who have already commenced treatment.

**B** - BNP or NT pro-BNP levels and/or an electrocardiogram should be recorded to indicate the need for echocardiography in

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| | patients with suspected heart failure.<br><br>**GPP** - In the assessment of suspected heart failure, BNP or NT pro-BNP levels should ideally be checked on samples taken prior to commencing therapy.<br><br><u>Echocardiography</u><br><br>As it may not be feasible, or cost effective to refer all patients with suspected heart failure for echocardiography, screening with either ECG and/or BNP is desirable. BNP testing has the practical advantage of being a simple blood test (see Figure 1 of the original guideline document).<br><br>**GPP** - Echocardiography is recommended in patients with suspected heart failure who have either a raised BNP or NT-proBNP level or abnormal electrocardiograph result to confirm the diagnosis and establish the underlying cause.<br><br>The investigation should include:<br><br>• A description of overall left ventricular systolic function together with any wall motion abnormalities<br>• Assessment of diastolic function<br>• Measurement of left ventricular wall thickness<br>• Doppler assessment of any significant valve disease<br>• Estimation of pulmonary artery systolic pressure, where possible<br><br>**GPP** - Echocardiography should be performed on modern high resolution equipment by suitably trained operators.<br><br><u>Chest X-Ray</u><br><br>The CXR is important to help exclude other causes of shortness of breath and to support a possible diagnosis of CHF. On its own it cannot be used to diagnose heart failure and must be used in combination with other sources of clinical evidence.<br><br>**B** - A CXR is recommended early in the diagnostic pathway to look for supportive evidence of CHF and to investigate other potential causes of breathlessness. |

| **TABLE 4: BENEFITS AND HARMS** |
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| **Benefits** |

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| **HFSA (2006)** | Accurate evaluation of ventricular dysfunction and heart failure |
| **NHFA/CSANZ (2006)** | Accurate diagnosis and appropriate management of CHF |
| **SIGN (2007)** | Appropriate management of CHF |
| **Harms** | |
| **HFSA (2006)** | Not stated |
| **NHFA/CSANZ (2006)** | No harms related to diagnosis are provided. |
| **SIGN (2007)** | No harms related to diagnosis are provided. |

| **TABLE 5: EVIDENCE RATING SCHEMES AND REFERENCES** | |
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| **Grading Schemes and References Supporting the Recommendations** | |
| **HFSA (2006)** | **Strength of Evidence**<br><br>**Level A**: Randomized, Controlled, Clinical Trials<br>May be assigned based on results of a single trial<br><br>**Level B**: Cohort and Case-Control Studies<br>Post hoc, subgroup analysis, and meta-analysis<br>Prospective observational studies or registries<br><br>**Level C**: Expert Opinion<br>Observational studies — epidemiologic findings<br>Safety reporting from large-scale use in practice<br><br>**Strength of Recommendations**<br><br>"Is recommended": Part of routine care<br>Exceptions to therapy should be minimized.<br><br>"Should be considered": Majority of patients should receive the intervention.<br>Some discretion in application to individual patients should be |

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| | allowed.<br><br>"May be considered": Individualization of therapy is indicated<br><br>"Is not recommended": Therapeutic intervention should not be used |
| **NHFA/CSANZ (2006)** | **Grades of Recommendations**<br><br>A. Rich body of high-quality randomized controlled trial (RCT) data<br>B. Limited body of RCT data or high-quality non-RCT data<br>C. Limited Evidence<br>D. No evidence available — panel consensus judgment |
| **SIGN (2007)** | **Grades of Recommendation**<br><br>*Note: The grade of recommendation relates to the strength of the evidence on which the recommendation is based. It does not reflect the clinical importance of the recommendation.*<br><br>**A**: At least one meta-analysis, systematic review of randomized controlled trials (RCTs), or RCT rated as 1++ and directly applicable to the target population; *or*<br><br>A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results<br><br>**B**: A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*<br><br>Extrapolated evidence from studies rated as 1++ or 1+<br><br>**C**: A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*<br><br>Extrapolated evidence from studies rated as 2++<br><br>**D**: Evidence level 3 or 4; *or*<br><br>Extrapolated evidence from studies rated as 2+<br><br>**Good Practice Points**: Recommended best practice based on the clinical experience of the guideline development group |

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| | **Levels of Evidence**<br><br>**1++**: High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias<br><br>**1+**: Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias<br><br>**1-**: Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias<br><br>**2++**: High quality systematic reviews of case control or cohort studies<br>High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal<br><br>**2+**: Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal<br><br>**2-**: Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal<br><br>**3**: Non-analytic studies (e.g. case reports, case series)<br><br>**4**: Expert opinion |

## GUIDELINE CONTENT COMPARISON

### Areas of Agreement

*Clinical Presentation/Assessment of Signs and Symptoms*

The groups agree that the assessment of signs and symptoms plays an important role in the diagnosis of CHF, but that a diagnosis cannot be made solely on clinical presentation. SIGN notes that there is no symptom or sign that is both sensitive and specific for the diagnosis of CHF, and that a purely clinical diagnosis is problematic.

The groups agree that a thorough clinical examination should be performed and should include an assessment of vital signs, auscultation of the patient, and investigation for signs of fluid retention. Characteristic signs or symptoms of CHF identified by all three groups include dyspnea, orthopnea, PND, elevated JVP, third heart sound, lateral displacement of the apex beat, basal crepitations, and edema.

*Diagnostic Investigations*

While the groups agree that the assessment of signs and symptoms plays an important role in the diagnosis of CHF, they also agree that diagnostic investigations aimed at assessing cardiac function are necessary to establish a diagnosis of CHF.

The groups agree that patients with suspected CHF should receive a variety of basic tests, and that the specific tests to be performed will vary according to the clinical presentation. There is overall agreement, however, that initial diagnostic workup will typically include a full blood count and urinalysis, as well as investigation of urea, electrolytes, creatinine, and glucose.

All three groups recommend that a chest X-ray be performed in patients with suspected CHF to support a possible diagnosis of CHF and to investigate other potential causes of breathlessness. All of the groups also agree that ECG is an appropriate investigation in patients with suspected CHF. There is overall agreement that if the ECG is normal, the diagnosis of heart failure is highly unlikely and alternative diagnoses should be considered. HFSA and NHFA/CSANZ recommend that an ECG be performed in every patient with suspected heart failure. Refer to Areas of Differences below for SIGN recommendations regarding ECG.

BNP

There is overall agreement that normal or low BNP/NT-proBNP levels indicate that CHF is unlikely. Recommendations regarding when BNP investigation is indicated, however, differ. Refer to Areas of Difference below.

Refer to Areas of Differences for recommendations regarding BMI cutpoints.

**Areas of Differences**

ECG

While HFSA and NHFA/CSANZ recommend ECG be performed in every patient with suspected heart failure, SIGN, in contrast, recommends that the patient undergo **either** an ECG **or** BNP test or (both depending on local circumstances) to determine the need for echocardiogram.

BNP

SIGN recommends that BNP testing be performed following the clinical examination and basic investigations, either alone or in addition to ECG, in order to determine the need for echocardiogram (they recommend echocardiography only in patients with raised BNP/NT-proBNP levels and/or abnormal electrocardiogram).

NHFA/CSANZ, in contrast, states that routine measurement of BNP or NT-proBNP is not recommended in the diagnosis of CHF, but that it may be considered in patients in whom the diagnosis is not clear and where an echocardiogram cannot

be performed in a timely fashion. Similar to NHFA/CSANZ, HFSA recommends that BNP or NT-proBNP levels be assessed in all patients suspected of having HF when the diagnosis is not certain.

Echocardiography

While NHFA/CSANZ recommends an echocardiogram be performed in every patient with suspected heart failure in order to establish a diagnosis and determine the mechanism of heart failure, SIGN, in contrast, recommends it be performed only in patients who have either a raised BNP or NT-pro-BNP level or abnormal ECG.

According to HFSA, selected groups of high-risk patients and patients with signs and symptoms of HF should undergo echocardiographic examination to assess cardiac structure and function. Included in this select group are patients with cardiomegaly, S3 gallop, or potentially significant heart murmurs detected during the physical examination.

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*This synthesis was prepared by ECRI Institute on March 1, 2009. The information was verified by HFSA on March 16, 2009 and by NHFA/CSANZ on April 9, 2009.*

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